

Chemistry 129.01, Spring 2017, General Chemistry

Midterm Exam: Friday, March 17th
S-1302

Topics you should be familiar with:

GREENHOUSE GAS MODULE

STOICHIOMETRY

- a. Balancing Equations
- b. Converting grams to moles, moles to grams
- c. Atomic mass units, molar mass
- d. Empirical analysis (may not always involve "nice round" numbers)

SOLUTIONS

- a. What is a solution?
 - i. Solvent, solute
 - ii. How do solutions form?, role of intermolecular forces.
- b. Factors affecting solubility
 - i. Intermolecular forces, temperature, pressure
 - ii. Gases
 - iii. Solids
- c. Saturated, unsaturated and supersaturated solutions and solubility
- d. Concentration (Molarity, dilutions)

STRUCTURE OF THE ATOM

- a. Determining wavelength of electromagnetic radiation given its frequency or energy.
- b. Atomic Structure
 - Cathode ray expt (Thompson)
 - Evidence electrons charge (Millikan)
 - Evidence of dense nuclei (Rutherford)
- c. Determining electrons/neutrons/protons in a given element/ion
- d. Be familiar with the electromagnetic spectrum, Line Spectra
- e. Bohr model of the hydrogen atom.
- f. Wave/quantum behavior of matter explains line spectra
- g. Energy level changes in hydrogen atom (absorption/emission)

ELECTRON CONFIGURATION

- a. Quantum numbers: n, l, m (meaning and allowed values)
- b. Spatial representations of orbitals (l)
- c. Electron configurations in atoms (filling of orbitals), orbital diagrams
 - Pauli Exclusion Principle, Hund's rules

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PERIODIC PROPERTIES

- a. Trends in atom/ion sizes, ionization energies and metallic character
 - i. --role of shielding
- a. Properties and reactivity similar by group.
- b. Metals form cations, Non-Metals form anions
- c. Identify and name simple ionic and molecular compounds

LEWIS STRUCTURES

- a. Non-ionic compounds form covalent complexes by sharing electrons
- b. Counting valence electrons
- c. Formal charge
- d. Oxidation Numbers (elements reduced or oxidized in chemical reactions, oxidizing and reducing agents)

MOLECULAR GEOMETRY

- a. Electrons repel one another, adopt geometry to minimize repulsion(VSEPR)
- b. Be able to assign geometries and bond angles for central atoms with 2-6 things around them.
- c. Predict dipole moment.

CHEMICAL BONDING

- a. Covalent bonding, strengths of bonds
- b. Hybrid Orbital theory
- c. Assigning hybridization knowing geometry
- d. Molecular Orbital Theory
 - i. Predict magnetic properties, bond order, bond strengths

OXIDATION NUMBERS

- a. Determine the oxidation numbers of elements.
- b. Identify elements as reduced or oxidized in chemical reactions

INTERMOLECULAR FORCES, AND LIQUIDS

- a. Differences between gases, liquids and solids
- b. Intermolecular forces
 - i. Ion-dipole forces, dipole-dipole forces, hydrogen bonding, and London dispersion forces
 - ii. Know relative strengths and effect on phase changes.
- c. Liquid Properties
 - i. Viscosity, surface tension, capillary action
- d. Phase Changes and phase diagrams
 - i. Exothermic or Endothermic?
 - ii. Vapor Pressure